

SEQUENCE LISTING

<110> FRANKEL, Fred R
PORTNOY, Daniel A.

<120> ISOLATED NUCLEIC ACIDS COMPRISING LISTERIA DAL AND DAT GENES

<130> 053893-5011-02

<150> 09/520,207

<151> 2000-03-07

<150> PCT/US98/24357

<151> 1998-11-13

<150> 08/972,902

<151> 1997-11-18

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<170> PatentIn version 3.1

<210> 1

<211> 1107

<212> DNA

<213> *Listeria monocytogenes*

<400> 1

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gctaattgcat atggtcacgg aattatcgaa gttgctagga cggcgaaaga agctggagca    180
aaaggtttct gcgtagccat tttagatgag gcaactggctc ttagagaagc tggatttcaa    240
gatgacttta ttcttgtgct tgggtgaacc agaaaagaag atgctaattct ggcagccaaa    300
aaccacattt cacttactgt ttttagagaa gattggctag agaattctaac gctagaagca    360
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gctaagttcc aaacgatttt aacgagttta aaaaaacgac caacttatgt tcatacagcc    600
aattcagctg cttcattgtt acagccacaa atcggttttg atgcgattcg ctttggattt    660
tcgatgtatg gattaactcc ctccacagaa atcaaaacta gcttgccgtt tgagcttaaa    720
cctgcaattg cactctatac cgagatggtt catgtgaaag aacttgcacc aggcgatagc    780
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 Ala Ile Arg Glu Asn Ile Lys Asn Glu Gln Asn Lys Leu Pro Glu Ser
 20 25 30
 Val Asp Leu Trp Ala Val Val Lys Ala Asn Ala Tyr Gly His Gly Ile
 35 40 45
 Ile Glu Val Ala Arg Thr Ala Lys Glu Ala Gly Ala Lys Gly Phe Cys
 50 55 60
 Val Ala Ile Leu Asp Glu Ala Leu Ala Leu Arg Glu Ala Gly Phe Gln
 65 70 75 80
 Asp Asp Phe Ile Leu Val Leu Gly Ala Thr Arg Lys Glu Asp Ala Asn
 85 90 95
 Leu Ala Ala Lys Asn His Ile Ser Leu Thr Val Phe Arg Glu Asp Trp
 100 105 110
 Leu Glu Asn Leu Thr Leu Glu Ala Thr Leu Arg Ile His Leu Lys Val
 115 120 125
 Asp Ser Gly Met Gly Arg Leu Gly Ile Arg Thr Thr Glu Glu Ala Arg
 130 135 140
 Arg Ile Glu Ala Thr Ser Thr Asn Asp His Gln Leu Gln Leu Glu Gly
 145 150 155 160
 Ile Tyr Thr His Phe Ala Thr Ala Asp Gln Leu Glu Thr Ser Tyr Phe
 165 170 175
 Glu Gln Gln Leu Ala Lys Phe Gln Thr Ile Leu Thr Ser Leu Lys Lys
 180 185 190
 Arg Pro Thr Tyr Val His Thr Ala Asn Ser Ala Ala Ser Leu Leu Gln
 195 200 205

Pro Gln Ile Gly Phe Asp Ala Ile Arg Phe Gly Ile Ser Met Tyr Gly
 210 215 220
 Leu Thr Pro Ser Thr Glu Ile Lys Thr Ser Leu Pro Phe Glu Leu Lys
 225 230 235 240
 Pro Ala Leu Ala Leu Tyr Thr Glu Met Val His Val Lys Glu Leu Ala
 245 250 255
 Pro Gly Asp Ser Val Ser Tyr Gly Ala Thr Tyr Thr Ala Thr Glu Arg
 260 265 270
 Glu Trp Val Ala Thr Leu Pro Ile Gly Tyr Ala Asp Gly Leu Ile Arg
 275 280 285
 His Tyr Ser Gly Phe His Val Leu Val Asp Gly Glu Pro Ala Pro Ile
 290 295 300
 Ile Gly Arg Val Cys Met Asp Gln Thr Ile Ile Lys Leu Pro Arg Glu
 305 310 315 320
 Phe Gln Thr Gly Ser Lys Val Thr Ile Ile Gly Lys Asp His Gly Asn
 325 330 335
 Thr Val Thr Ala Asp Asp Ala Ala Gln Tyr Leu Asp Thr Ile Asn Tyr
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 Glu Val Thr Cys Leu Leu Asn Glu Arg Ile Pro Arg Lys Tyr Ile His
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<210> 3
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 <212> PRT
 <213> *Listeria monocytogenes*

<400> 3

Met Asn Asp Phe His Arg Asp Thr Trp Ala Glu Val Asp Leu Asp Ala
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 20 25 30
 His Ile Met Ala Val Val Lys Ala Asn Ala Tyr Gly His Gly Asp Val
 35 40 45
 Gln Val Ala Arg Thr Ala Leu Glu Arg Gly Pro Pro Pro Ala Val Ala
 50 55 60
 Phe Leu Asp Glu Ala Leu Ala Leu Arg Glu Lys Gly Ile Glu Ala Pro
 65 70 75 80
 Ile Leu Val Leu Gly Ala Ser Arg Pro Ala Asp Ala Ala Leu Ala Ala
 85 90 95

Gln Gln Arg Ile Ala Leu Thr Val Phe Arg Ser Asp Trp Leu Glu Glu
 100 105 110
 Ala Ser Ala Leu Tyr Ser Gly Pro Phe Pro Ile His Phe His Leu Lys
 115 120 125
 Met Asp Thr Gly Met Gly Arg Leu Gly Val Lys Asp Glu Glu Glu Thr
 130 135 140
 Lys Arg Ile Val Ala Leu Ile Glu Arg His Pro His Phe Val Leu Glu
 145 150 155 160
 Gly Leu Tyr Thr His Phe Ala Thr Ala Asp Glu Val Asn Thr Asp Tyr
 165 170 175
 Phe Ser Tyr Gln Tyr Thr Arg Phe Leu His Met Leu Glu Trp Leu Pro
 180 185 190
 Ser Arg Pro Pro Leu Val His Cys Ala Asn Ser Ala Ala Ser Leu Arg
 195 200 205
 Phe Pro Asp Arg Thr Phe Asn Met Val Arg Phe Gly Ile Ala Met Tyr
 210 215 220
 Gly Leu Ala Pro Ser Pro Gly Ile Lys Pro Leu Leu Pro Tyr Pro Leu
 225 230 235 240
 Lys Glu Ala Phe Ser Leu His Ser Arg Leu Val His Val Lys Lys Leu
 245 250 255
 Gln Pro Gly Glu Lys Val Ser Tyr Gly Ala Thr Tyr Thr Ala Gln Thr
 260 265 270
 Glu Glu Trp Ile Gly Thr Ile Pro Ile Gly Tyr Ala Asp Gly Val Arg
 275 280 285
 Arg Leu Gln His Phe His Val Leu Val Asp Gly Gln Lys Ala Pro Ile
 290 295 300
 Val Gly Arg Ile Cys Met Asp Gln Cys Met Ile Arg Leu Pro Gly Pro
 305 310 315 320
 Leu Pro Val Gly Thr Lys Val Thr Leu Ile Gly Arg Gln Gly Asp Glu
 325 330 335
 Val Ile Ser Ile Asp Asp Val Ala Arg His Leu Glu Thr Ile Asn Tyr
 340 345 350
 Glu Val Pro Cys Thr Ile Ser Tyr Arg Val Pro Arg Ile Phe Phe Arg
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 His Lys Arg Ile Met Glu Val Arg Asn Ala Ile Gly Arg Gly Glu Ser
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 Ser Ala
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<210> 4
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 <213> *Listeria monocytogenes*

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 20 25 30
 His Val His Leu Met Ala Val Glu Lys Ala Asn Ala Tyr Gly His Gly
 35 40 45
 Asp Ala Glu Thr Ala Lys Ala Ala Leu Asp Ala Gly Ala Ser Cys Leu
 50 55 60
 Ala Met Ala Ile Leu Asp Glu Ala Ile Ser Leu Arg Lys Lys Gly Leu
 65 70 75 80
 Lys Ala Pro Ile Leu Val Leu Gly Ala Val Pro Pro Glu Tyr Val Ala
 85 90 95
 Ile Ala Ala Glu Tyr Asp Val Thr Leu Thr Gly Tyr Ser Val Glu Trp
 100 105 110
 Leu Gln Glu Ala Ala Arg His Thr Lys Lys Gly Ser Leu His Phe His
 115 120 125
 Leu Lys Val Asp Thr Gly Met Asn Arg Leu Gly Val Lys Thr Glu Glu
 130 135 140
 Glu Val Gln Asn Val Met Ala Ile Leu Asp Arg Asn Pro Arg Leu Lys
 145 150 155 160
 Cys Lys Gly Val Phe Thr His Phe Ala Thr Ala Asp Glu Lys Glu Arg
 165 170 175
 Gly Tyr Phe Leu Met Gln Phe Glu Arg Phe Lys Glu Leu Ile Ala Pro
 180 185 190
 Leu Pro Leu Lys Asn Leu Met Val His Cys Ala Asn Ser Ala Ala Gly
 195 200 205
 Leu Arg Leu Lys Lys Gly Phe Phe Asn Ala Val Arg Phe Gly Ile Gly
 210 215 220
 Met Tyr Gly Leu Arg Pro Ser Ala Asp Met Ser Asp Glu Ile Pro Phe
 225 230 235 240
 Gln Leu Arg Pro Ala Phe Thr Leu His Ser Thr Leu Ser His Val Lys
 245 250 255
 Leu Ile Arg Lys Gly Glu Ser Val Ser Tyr Gly Ala Glu Tyr Thr Ala
 260 265 270

Glu Lys Asp Thr Trp Ile Gly Thr Val Pro Val Gly Tyr Ala Asp Gly
 275 280 285
 Trp Leu Arg Lys Leu Lys Gly Thr Asp Ile Leu Val Lys Gly Lys Arg
 290 295 300
 Leu Lys Ile Ala Gly Arg Ile Cys Met Asp Gln Phe Met Val Glu Leu
 305 310 315 320
 Asp Gln Glu Tyr Pro Pro Gly Thr Lys Val Thr Leu Ile Gly Arg Gln
 325 330 335
 Gly Asp Glu Tyr Ile Ser Met Asp Glu Ile Ala Gly Arg Leu Glu Thr
 340 345 350
 Ile Asn Tyr Glu Val Ala Cys Thr Ile Ser Ser Arg Val Pro Arg Met
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 Phe Leu Glu Asn Gly Ser Ile Met Glu Val Arg Asn Pro Leu Leu Gln
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 Val Asn Ile Ser Asn
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<210> 5
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 <213> *Listeria monocytogenes*

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 ttctttactt ataatgaaca cattgatcgc ttatatgcta gtgcagcaaa aattgactta 180
 gttattcctt attccaaaga agagctacgt gaattacttg aaaaattagt tgccgaaaat 240
 aatatcaata cagggaatgt ctatttacia gtgactcgtg gtgttcaaaa cccacgtaat 300
 catgtaatcc ctgatgattt ccctctagaa ggcgttttaa cagcagcagc tcgtgaagta 360
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 tggttacgct gtgatattaa gagcttaaac cttttaggaa atattctagc aaaaaataaa 480
 gcacatcaac aaaatgcttt ggaagctatt ttacatcgcg gggaacaagt aacagaatgt 540
 tctgcttcaa acgtttctat tattaagat ggtgtattat ggacgcatgc ggagataac 600
 ttaatcttaa atggtatcac tcgtcaagtt atcattgatg ttgcgaaaaa gaatggcatt 660
 cctgttaaag aagcggattt cactttaaca gacctcgtg aagcggatga agtgttcatt 720
 tcaagtacaa ctattgaaat tacacctatt acgcatattg acggagttca agtagctgac 780

ggaaaacgtg gaccaattac agcgcaactt catcaatatt ttgtagaaga aatcactcgt 840
gcatgtggcg aattagagtt tgcaaaataa 870

<210> 6
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<212> PRT
<213> *Listeria monocytogenes*

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20 25 30
Val Val Arg Leu Tyr Asn Gly Lys Phe Phe Thr Tyr Asn Glu His Ile
35 40 45
Asp Arg Leu Tyr Ala Ser Ala Ala Lys Ile Asp Leu Val Ile Pro Tyr
50 55 60
Ser Lys Glu Glu Leu Arg Glu Leu Leu Glu Lys Leu Val Ala Glu Asn
65 70 75 80
Asn Ile Asn Thr Gly Asn Val Tyr Leu Gln Val Thr Arg Gly Val Gln
85 90 95
Asn Pro Arg Asn His Val Ile Pro Asp Asp Phe Pro Leu Glu Gly Val
100 105 110
Leu Thr Ala Ala Ala Arg Glu Val Pro Arg Asn Glu Arg Gln Phe Val
115 120 125
Glu Gly Gly Thr Ala Ile Thr Glu Glu Asp Val Arg Trp Leu Arg Cys
130 135 140
Asp Ile Lys Ser Leu Asn Leu Leu Gly Asn Ile Leu Ala Lys Asn Lys
145 150 155 160
Ala His Gln Gln Asn Ala Leu Glu Ala Ile Leu His Arg Gly Glu Gln
165 170 175
Val Thr Glu Cys Ser Ala Ser Asn Val Ser Ile Ile Lys Asp Gly Val
180 185 190
Leu Trp Thr His Ala Ala Asp Asn Leu Ile Leu Asn Gly Ile Thr Arg
195 200 205
Gln Val Ile Ile Asp Val Ala Lys Lys Asn Gly Ile Pro Val Lys Glu
210 215 220
Ala Asp Phe Thr Leu Thr Asp Leu Arg Glu Ala Asp Glu Val Phe Ile
225 230 235 240

Ser Ser Thr Thr Ile Glu Ile Thr Pro Ile Thr His Ile Asp Gly Val
245 250 255
Gln Val Ala Asp Gly Lys Arg Gly Pro Ile Thr Ala Gln Leu His Gln
260 265 270
Tyr Phe Val Glu Glu Ile Thr Arg Ala Cys Gly Glu Leu Glu Phe Ala
275 280 285

Lys

<210> 7
<211> 282
<212> PRT
<213> *Listeria monocytogenes*

<400> 7
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Lys Val Ser Tyr Glu Asp Arg Gly Tyr Val Phe Gly Asp Gly Ile Tyr
20 25 30
Glu Tyr Ile Arg Ala Tyr Asp Gly Lys Leu Phe Thr Val Thr Glu His
35 40 45
Phe Glu Arg Phe Ile Arg Ser Ala Ser Glu Ile Gln Leu Asp Leu Gly
50 55 60
Tyr Thr Val Glu Glu Leu Ile Asp Val Val Arg Glu Leu Leu Lys Val
65 70 75 80
Asn Asn Ile Gln Asn Gly Gly Ile Tyr Ile Gln Ala Thr Arg Gly Val
85 90 95
Ala Pro Arg Asn His Ser Phe Pro Thr Pro Glu Val Lys Pro Val Ile
100 105 110
Met Ala Phe Ala Lys Ser Tyr Asp Arg Pro Tyr Asp Asp Leu Glu Asn
115 120 125
Gly Ile Asn Ala Ala Thr Val Glu Asp Ile Arg Trp Leu Arg Cys Asp
130 135 140
Ile Lys Ser Leu Asn Leu Leu Gly Asn Val Leu Ala Lys Glu Tyr Ala
145 150 155 160
Val Lys Tyr Asn Ala Gly Glu Ala Ile Gln His Arg Gly Glu Thr Val
165 170 175
Thr Glu Gly Ala Ser Ser Asn Val Tyr Ala Ile Lys Asp Gly Ala Ile
180 185 190
Tyr Thr His Pro Val Asn Asn Tyr Ile Leu Asn Gly Ile Thr Arg Lys
195 200 205

Val Ile Lys Trp Ile Ser Glu Asp Glu Asp Ile Pro Phe Lys Glu Glu
 210 215 220

Thr Phe Thr Val Glu Phe Leu Lys Asn Ala Asp Glu Val Ile Val Ser
 225 230 235 240

Ser Thr Ser Ala Glu Val Thr Pro Val Val Lys Ile Asp Gly Glu Gln
 245 250 255

Val Gly Asp Gly Lys Val Gly Pro Val Thr Arg Gln Leu Gln Glu Gly
 260 265 270

Phe Asn Lys Tyr Ile Glu Ser Arg Ser Ser
 275 280

<210> 8
 <211> 283
 <212> PRT
 <213> *Listeria monocytogenes*

<400> 8
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Thr Ile Ser Pro Glu Asp Arg Gly Tyr Gln Phe Gly Asp Gly Ile Tyr
 20 25 30

Glu Val Ile Lys Val Tyr Asn Gly His Met Phe Thr Ala Gln Glu His
 35 40 45

Ile Asp Arg Phe Tyr Ala Ser Ala Glu Lys Ile Arg Leu Val Ile Pro
 50 55 60

Tyr Thr Lys Asp Val Leu His Lys Leu Leu His Asp Leu Ile Glu Lys
 65 70 75 80

Asn Asn Leu Asn Thr Gly His Val Tyr Phe Gln Ile Thr Arg Gly Thr
 85 90 95

Thr Ser Arg Asn His Ile Phe Pro Asp Ala Ser Val Pro Ala Val Leu
 100 105 110

Thr Gly Asn Val Lys Thr Gly Glu Arg Ser Ile Glu Asn Phe Glu Lys
 115 120 125

Gly Val Lys Ala Thr Leu Val Glu Asp Val Arg Trp Leu Arg Cys Asp
 130 135 140

Ile Lys Ser Leu Asn Leu Leu Gly Ala Val Leu Ala Lys Gln Glu Ala
 145 150 155 160

Ser Glu Lys Gly Cys Tyr Glu Ala Ile Leu His Arg Gly Asp Ile Ile
 165 170 175

Thr Glu Cys Ser Ser Ala Asn Val Tyr Gly Ile Lys Asp Gly Lys Leu
 180 185 190

Tyr Thr His Pro Ala Asn Asn Tyr Ile Leu Asn Gly Ile Thr Arg Gln
 195 200 205

Val Ile Leu Lys Cys Ala Ala Glu Ile Asn Leu Pro Val Ile Glu Glu
 210 215 220

Pro Met Thr Lys Gly Asp Leu Leu Thr Met Asp Glu Ile Ile Val Ser
 225 230 235 240

Ser Val Ser Ser Glu Val Thr Pro Val Ile Asp Val Asp Gly Gln Gln
 245 250 255

Ile Gly Ala Gly Val Pro Gly Glu Trp Thr Arg Lys Leu Gln Lys Ala
 260 265 270

Phe Glu Ala Lys Leu Pro Ile Ser Ile Asn Ala
 275 280

<210> 9
 <211> 283
 <212> PRT
 <213> *Listeria monocytogenes*

<400> 9
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Lys Ile Asp Lys Glu Asp Arg Gly Tyr Gln Phe Gly Asp Gly Val Tyr
 20 25 30

Glu Val Val Lys Val Tyr Asn Gly Glu Met Phe Thr Val Asn Glu His
 35 40 45

Ile Asp Arg Leu Tyr Ala Ser Ala Glu Lys Ile Arg Ile Thr Ile Pro
 50 55 60

Tyr Thr Lys Asp Lys Phe His Gln Leu Leu His Glu Leu Val Glu Lys
 65 70 75 80

Asn Glu Leu Asn Thr Gly His Ile Tyr Phe Gln Val Thr Arg Gly Thr
 85 90 95

Ser Pro Arg Ala His Gln Phe Pro Glu Asn Thr Val Lys Pro Val Ile
 100 105 110

Ile Gly Tyr Thr Lys Glu Asn Pro Arg Pro Leu Glu Asn Leu Glu Lys
 115 120 125

Gly Val Lys Ala Thr Phe Val Glu Asp Ile Arg Trp Leu Arg Cys Asp
 130 135 140

Ile Lys Ser Leu Asn Leu Leu Gly Ala Val Leu Ala Lys Gln Glu Ala
 145 150 155 160

His Glu Lys Gly Cys Tyr Glu Ala Ile Leu His Arg Asn Asn Thr Val
 165 170 175

Thr Glu Gly Ser Ser Ser Asn Val Phe Gly Ile Lys Asp Gly Ile Leu
 180 185 190
 Tyr Thr His Pro Ala Asn Asn Met Ile Leu Lys Gly Ile Thr Arg Asp
 195 200 205
 Val Val Ile Ala Cys Ala Asn Glu Ile Asn Met Pro Val Lys Glu Ile
 210 215 220
 Pro Phe Thr Thr His Glu Ala Leu Lys Met Asp Glu Leu Phe Val Thr
 225 230 235 240
 Ser Thr Thr Ser Glu Ile Thr Pro Val Ile Glu Ile Asp Gly Lys Leu
 245 250 255
 Ile Arg Asp Gly Lys Val Gly Glu Trp Thr Arg Lys Leu Gln Lys Gln
 260 265 270
 Phe Glu Thr Lys Ile Pro Lys Pro Leu His Ile
 275 280